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# EFFECTS OF PURPOSEFUL VS. NON-PURPOSEFUL CONDITIONS DURING THE MOST AND LEAST PREFERRED ACTIVITIES

by

RITA BAKSHI

(C)

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE SUTIDES AND RESEARCH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE

DEPARTMENT OF OCCUPATIONAL THERAPY

EDMONTON, ALBERTA

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# ABSTRACT

The purpose of this study was to compare the number of movements (# of Mov), physiological responses, namely, heart rate (HR) and blood pressure (BP), and rating of perceived exertion (RPE) during the performance of purposeful and non-purposeful conditions for the most and least preferred activities. The subjects, twenty healthy female volunteers who were unaware of the objectives of the study, were provided with a list of eight activities. After watching a demonstration, subjects were asked to select an activity which they preferred the most and another that they preferred the least. After a two minute practice session with these activities, the subjects were assigned randomly to one of the four possible activity sequences. The data were analyzed using a two-way analysis of variance with repeated measures. The significant 'F' ratios were subjected to the appropriate 't' test to locate the differences between conditions and activities. The alpha level for significance was set at 0.05. The results showed no significant differences in # of mov performed by each subject during the two activities for both conditions. The increase in HR was significantly higher during the non-purposeful condition for both the most and least preferred activities; and during the purposeful condition for the least preferred activity. The results showed no significant increases in BP during either condition in both activities. The RPE scores were significantly higher during the least preferred activities for both purposeful and non-purposeful conditions. The RPE scores were not significantly different between the purposeful and nonpurposeful conditions for both the activities. The results suggest that preference and purpose could be important in predicting performance effort. The results

also suggest that engagement in a prefered purposeful activity may minimize cardiovascular stress and perceived exertion during therapy sessions, thereby enhancing progress in activity based rehabilitation programs. It is recommended that further research be undertaken to examine these variables with client populations.

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# CHAPTER I

## STATEMENT OF PROBLEM

### Introduction

The philosophical basis of occupational therapy is the use of purposeful activity as one of the primary treatment modalities (Mosey, 1980). Activity is the core of occupational therapy practice and the therapeutic use of activity is unique to this health discipline (Reed, 1984).

As early as 1918, while describing the term "Occupational Therapy," Dunton wrote, "Occupation or activity must have some useful end to be an effective tool in the treatment of mental and physical disabilities (p 317)." At that time, no published scientific evidence was available to support his statement. Some thirty years later, there was support for the concept (Howland,1944 ; Taber, Baron & Blackwell,1953; Reilly,1960; Yerxa,1967; Fidler & Fidler,1978; Fidler,1981; Rogers,1983). Besides having a useful end product, many believed that motivation was intrinsic to therapeutic activity and it could be enhanced if clients selected activities based on their interests (Shontz,1959; Florey,1969; Cynkin,1974; King,1978). The underlying assumption was that the greater the interest, the higher the motivation to perform an activity. Higher motivation was presumed to lead to longer periods of engagement, thus increasing the probability of achieving the treatment goal faster.

In occupational therapy practice, therapists have tried to select therapeutic activities which they thought would interest their clients and thereby motivate them . However some have questioned the need for an activity to be purposeful and the importance of the client's choice and interest, given the difficulty in finding appropriate, purposeful therapeutic activities to suit all clients' interests.

## Problem

Only recently researchers have shown some interest in demonstrating the value of purposeful activity empirically. The first empirical work that could be located was published by Kircher in 1984, who studied the rating of perceived exertion (RPE) during the performance of purposeful and non-purposeful activity. Results of her study indicated that a normal subject may not perceive fatigue as readily when involved in a goal-directed, purposeful activity. Subsequently, Steinbeck (1986) compared the number of repetitions performed, the heart rate (HR) and the electromyogram (EMG) records for purposeful and non-purposeful activities. The results showed that a significant increase in HR and greater number of repetitions were performed during the purposeful activities than during the non-purposeful activities at similar RPE values. However, Thibodeaux and Ludwig (1988) produced conflicting findings to those of Kircher and Steinbeck. Thibodeaux and Ludwig found no significant difference in their subjects' HR increase or in the time it took the subjects to perceive a RPE of 15 (i.e, working "hard") when engaged in either product-oriented or non-product oriented activities. Recently, Bloch, Smith, and Nelson (1989) replicated Kircher's study and was unable to dublicate their findings. They observed significant difference in HR during jumping with than without a rope, and reported that there were no significant difference in duration of jumping at a similar RPE value. These findings supported those of Thibodeaux and Ludwig.

Besides these conflicting results, all the studies cited above had major limitations: (1) the subjects were not given a choice of the activities they preferred. This however, raises the question of whether freedom to choose an activity affects the performance of that activity, or whether all goal-directed activities provide sufficient reinforcement , regardless of the issue of choice, (2) the length of time spent in purposeful and non-purposeful activities was not controlled. HR, number of

repetitions, and subjects' RPE might have been different if both activity conditions had been administered for a given time period rather than to a specific RPE level. Besides these above two limitations, Thibodeaux and Ludwig (1988) used occupational therapy students as subjects, who should might been aware of the importance of purposeful activities and this could have confounded their findings. To date, no study has been conducted to examine whether there is a difference between purposeful and non-purposeful conditions when the subjects are allowed to perform activities of their own choice under both conditions.

The present study was undertaken to examine further the role of purposeful and non-purposeful activities in occupational therapy practice and to overcome some of the limitations of the previous research in this area. More specifically, the purpose of this study was to compare the number of movements, physiological responses, and perceptual responses during the purposeful and non-purposeful conditions for both most and least preferred activities. The physiological responses studied were HR and BP. The perceptual response examined was the rating of perceived exertion (RPE) (Borg, 1982).

## Research Hypotheses

The following null hypotheses were examined in this study:

There would be no significant differences between the purposeful and non-purposeful conditions when subjects performed the most and least preferred activities

For each hypothesis, the following variables were examined:

(a) number of movements (# of Mov)

(b) heart rate (HR)

(c) blood pressure (BP), and

(d) rating of perceived exertion (RPE)

## Delimitations

(a) Only 20 female university student volunteers between the ages of 18 and 30 years were studied.

(b) Choice was restricted to eight activities that are commonly used for therapeutic purposes by occupational therapists, but was not graded on any scale.

## Limitations

(a) Some subjects could have been intimidated by the unfamiliar setting and equipment and therefore performed in an erratic manner.

(b) The repetitive movements of non-purposeful activities were not exactly the same as the purposeful ones, although very similar.

## Definition of Terms

For the purpose of this study, the following definitions were used:

1. Purposeful Activity : An activity, task, or process that was goal-directed, valued and meaningful to the subject with a tangible useful end product (adapted from Health and Welfare Canada/ Canadian Association of Occupational Therapists,1986; Kircher, 1984).

2. Non-Purposeful Activity : The absence of a goal-directed activity, task, or process which was neither valued nor meaningful to the subject without any tangible and useful end product.

NOTE- In this study the purposeful / non-purposeful component was classified as a condition for most and least preferred activities.

3. Most Preferred Activity : The activity the subject chose as the one she was most interested in performing.

4. Least Preferred Activity : The activity the subject chose, as the one she was least interested in performing.

5. Number of Movements (# of Mov) : The number of times each action was repeated for the duration of the activity.

6. Heart Rate (HR) : Heart rate was the number of ventricular beats per minute recorded during performance (Astrand and Rodahl, 1986).

7. Blood Pressure (BP) : The driving force that moves the blood through the circulatory system (Fox and Mathews, 1981).

8. Rating of Perceived Exertion (RPE) : A subjective estimate of the degree of physical strain experienced while performing a manual or physical activity (Borg, 1982).

# CHAPTER II

## LITERATURE REVIEW

The practice of occupational therapy has undergone many changes over the century. Development is evident in (1) the methods of treatment; (2) the development of models, theories and frameworks; (3) a focus on activity as an essential element within the therapeutic process as opposed to keeping individuals busy or diverting their attention; and (4) the expansion of practice beyond hospital settings. In spite of all these changes, two basic concepts remain: intrinsic motivation and purposeful activity (Hopkins and Smith, 1983). Both are used therapeutically to influence an individual's physical and mental health. Over the years, many researchers have taken different approaches in defining the term "purposeful activity " and in investigating its importance as a treatment modality.

### Descriptive Studies

When writing the principles of occupational therapy for the American Association of Occupational Therapy, Dunton (1918) maintained the philosophy that occupational therapy should use an occupation or activity which had some useful end and that was interesting in order to treat both physical and mental disabilities effectively. However, there was no documentation to support his use of that concept. During the 1920's, Burnette (1923) reported that activities were selected according to the interest and work history of the individual. During that decade, he also called for quantitative and qualitative research to support the basic concept underlying occupational therapy : the importance of engagement in purposeful activity. However, more attention appears to have been given to the expansion of occupational therapy services than research activities, as little research was reported during the decade.

LeVesconte (1935) indicated that clients' attention spans were longer when they were involved in activities they liked, and at times they performed such activities for longer periods of time. It was reported that the clients were more motivated to attend occupational therapy sessions when they were allowed to do activities of their choice. Apparently clients were observed to spend less time sitting in their rooms doing nothing.

During the forties, Howland (1944) suggested that crafts should be selected to reflect the interests of the clients. He felt that clients should not be assigned stereotyped forms of occuptional therapy. Instead, treatment should accommodate the clients' physical needs, work histories, and above all their individual interests. Howland indicated that the clients were more cooperative and benefitted from the treatment earlier when therapeutic activities were selected reflecting their work histories and interests.

Over the last three decades, researchers have been actively involved in defining the meaning of "purposeful activity" and investigating the importance of providing a craft according to the client's choice and interest. Taber, Baron, and Blackwell (1953) studied the benefit of assigning a craft rather than allowing the client the free choice of a craft in a psychiatric setting. They concluded that clients made greater progress with the freely chosen activities. Several authors (Shontz, 1959; Florey, 1969; King, 1978) consider that client motivation to be one of the basic concepts of occupational therapy. They indicated that the easiest way to increase a client's motivation was to provide a task which was goal directed and had a tangible end product. They also reported that the clients were more motivated and eager to carry out their therapy when the activities were goal directed. Reilly (1962) and Yerxa (1967) stated that individuals could influence the state of their health through purposeful action and occupation. The purposeful activity or occupation was more beneficial to the development of self-confidence and motivation.

Cynkin (1974) and Fidler (1981) outlined some characteristics of purposeful activity if the concept was to be successfully used in occupational therapy practice.The activity had to be intrinsically gratifying and needed to match the individual's motor, cognitive, and social readiness to learn. Most importantly, it had to be valued by society. Fidler and Fidler (1978) found that purposeful activity provided a means of self-actualization . Di Joseph (1982) demonstrated that purposeful activity involved both the body and the mind and it could lead to greater performance to achieve a higher level of output . Fidler (1981) claimed that purposeful activity provided an incentive to the individual to achieve mastery and a sense of competence. Rogers (1983), while describing the role and function of occupational therapy in long term care, mentioned that purposeful activity should be selected to mirror the therapeutic needs and interests of the individual . Rocker and Nelson (1987) reported a significant difference in hostility and energy between two groups of occupational therapy students. The group which was not allowed to keep their products were reported to be more hostile and had higher energy levels than the group who were permitted to keep their products.These findings suggest that both purpose and intrinsic motivation played an important role in the behavior of these students.

## Empirical Studies

Over the years, many authors have tried to explain the importance of the purposeful activity based on their observations, speculations, and assumptions, but it is only recently that researchers felt the need to demonstrate the value of purposeful activity empirically. However prior to such an undertaking, a definition of "purposeful activity" as well as a way to differentiate it from "non-purposeful activity" was necessary. Hinojosa, Sabari, and Rosenfeld (1983) defined purposeful activity as a

"task or experience in which the person actively participates." Breines (1984) suggested that purposeful activity should be defined in terms of the client's growth and involvement rather than by modalities used by occupational therapists. Kasch (1985) defined purposeful activity as activity which increased behavioral competence. Several other terms are currently in use by different authors, but all definitions have essentially the same meaning

The concepts of motivation and purposeful activity were first studied empirically by Kircher in 1984. She studied perceived exertion during the performance of purposeful and non-purposeful activity. The subject's HR and length of time worked under both the experimental conditions were monitored. During purposeful activity, all subjects jumped with a rope; during non-purposeful activity, all subjects were required to jump in one place without any rope. Borg's Scale of Perceived Exertion was used to determine when the subjects could discontinue the activity. Kircher reported that the HR increase at a given RPE was significantly higher for jumping with a rope than without. There was no significant difference in exercise time between the two types of activities. She concluded that normal subjects may not perceive fatigue as readily when they are involved in a goal directed, purposeful activity

Subsequently, Bloch, Smith, and Nelson (1989) replicated the study by Kircher with some modifications. They compared increase in HR, duration of jumping, subjects rating of affective meaning of the activities, and activity preferences during jumping with and without a rope. A standardized HR target zone formula was used to ensure safe maximum exertion. The authors reported that the HR increase at a given RPE was significantly higher during jumping with a rope than without. All subjects completed the Osgood Semantic Differential (OSD) scale after each jumping activity to measure the affective component. There were no significant differences on the three factors of

affective meanings and no other significant differences in the time taken by the subjects to perceive a RPE of 17 (i.e., working "very hard") when enged in either activity. No significant difference in preference for jumping with or without a ropewas reported.

However, some major limitations in the design in these studies (Kircher & Bloch, et al.) were evident . Subjects were not given a choice of activities; and both purposeful and non-purposeful activities were not performed for a controlled length of time.

Steinbeck (1986) compared the number of repetitions performed, the HR and the electromyographic (EMG) activity recorded during purposeful and non-purposeful activities performed by 15 male and 15 female subjects. Each subject performed the purposeful and non-purposeful activities for both upper and lower extremities. The subjects were asked to stop the activities when they felt they were working "somewhat hard" (a rating of 13 on Borg's RPE scale). All the activities were done at a regulated speed. Steinbeck concluded that the mean number of repetitions for the upper and lower extremities during purposeful activity was significantly greater than for non-purposeful activities. However, HR and EMG studies reported by Steinbeck showed different trends. The mean HR and EMG were higher for the non-purposeful lower extremity and purposeful upper extremity activities. The EMG record was significantly higher for the purposeful hand activity. These results suggested that subjects worked harder during non-purposeful lower extremity activity and purposeful upper extremity activity. An interest questionnaire was also administratred to the subjects, but no details about the format or content were given. No raw or mean scores from the questionnaire were reported. However, he did report that the interest was significantly greater in the purposeful activities for both the lower and upper extremity activities. Steinbeck concluded that the individual is motivated to perform a purposeful activity for a longer

period of time. Simple 't' tests were used to analyze the data; however, analysis of variance could have been used to examine the combined influence of upper and lower extremities. Some of these findings could have been the result of interaction between the actions of upper and lower extremities. Another limitation of the study was that subjects were not given a choice of activities. Steinbeck strongly recommended that further research examine the physiological factors, including RPE, and concentrate on controlled duration rather than exertion levels.

Recently Thibodeaux and Ludgwig (1988) investigated the role of purposeful activity as an intrinsic motivator. They hypothesized that " individuals would take longer to perceive themselves to be working hard and would have a higher heart rate increase when working on a product-oriented activity, than when working on a non-product oriented activity (p. 169)." The subjects were 15 female occupational therapy students. The product-oriented activity was to sand a cutting board, which the subjects could keep. The non-product-oriented activity was to sand a piece of wood which the subjects could not keep. For both activities, subjects were instructed to stop sanding when they reached a rating of 15 (i.e.,working "hard") on the Borg Rating Scale of Perceived Exertion. The increase in heart rate and performance time were recorded. The heart rate was recorded by palpation of the carotid artery in the neck for 15 seconds and then multiplying that value by 4. The accuracy of ascertaining the HR by this technique may be questionable (Astrand and Rodahl,1986). Results showed no significant difference in performance time or increase in HR for product-oriented and non-product-oriented activities. Besides recording the heart rate and performance time, Thibodeaux and Ludgwig administered two separate questionnaires, one after sanding of the cutting board and another after sanding of the wood. They concluded, with statistical support, that the subjects enjoyed sanding the cutting board more than the wood. Some

interesting results were reported after the fifteen subjects were divided into three groups of five each. All subjects in the first group, and four subjects from each of the other two groups, worked significantly longer in sanding the cutting board. Three subjects from the first group and four subjects from the other two groups showed a greater increase in heart rate during sanding the wood. Thibodeaux and Ludgwig detailed some limitations of their study, which included (1) that there was no choice of activities, (2) that all subjects were occupational therapy students, and (3) that the validity and reliability of their questionnaires were unknown.

## Ratings of Perceived Exertion

The three empirical studies reviewed above used the Rating of Perceived Exertion Scale developed by Borg (1982) (Appendix A). During dynamic exercise, the HR at a given exercise intensity roughly corresponds to 10 times the RPE scale (Pandolf, 1983). The scale uses numbers from 6 to 20, with the odd numbers qualified by descriptive words. Borg (1970) and Skinner (1969 ) reported a strong correlation ($r = 0.80 - 0.90$), between HR and RPE during exercise.

Gamberale (1972) studied RPE responses for various tasks and concluded that they were related to HR in a fairly linear way, irrespective of the variation of the work. The results showed that the RPE scale increased linearly with both exercise intensity and heart rate. A higher correlation ($r = 0.94$) between the RPE and HR was reported when subjects were instructed to rate their overall perception of effort. Stamford (1976) concluded that the RPE responses during the final minute of exercise were as reliable as the HR. He compared RPE responses to HR during different phases of the same task and concluded that the RPE scale offered a very simple and reliable measurement of stress during exercise.

Borg (1977) indicated that psychological factors such as learning, motivation, and environmental setting also account for the perception of effort. Morgan (1973) believed that approximately two-thirds of the perception of effort is accounted for by physiological factors; the remaining one-third is related to psychometric factors. He concluded that hypnotic suggestion can have an effect on RPE. Cardarette, Hoffman, Caudill, Kutz, Levine, Benson, and Goldman (1982), supported Morgan's contention that meditation practice also influenced RPE.

Recently, researchers in the field of occupational therapy have used the RPE scale as a means of regulating the intensity of activity of subjects while monitoring thier physiological responses. As well, this scale could be used by occupational therapists to evaluate the efficacy of occupational therapy intervention programs on clients' performance in a variety of clinical settings.

## Summary

The literature revealed that when activities were freely chosen according to clients' interests, individuals were more content and engaged in those activities for longer periods and acheived their treatment goals faster. Many authors (Taber et al. 1953; Shontz, 1959; Florey, 1969; King, 1978) indicated that the easiest way to increase a client's motivation was to provide an activity which was goal directed and had an end product. It was assumed that purposeful activity provided incentives to the individual to achieve mastery and a sense of competence.

All the empirical studies reported that the subjects perceived less exertion while performing the purposeful activities and also worked for longer periods of time (Kircher, 1984; Steinbeck, 1986; Thibodeaux & Ludwig,1988; Bloch, et al.1989).

It appears that purposeful activity has a positive influence on an individual's

performance. The limitations and contradictory findings of previous studies indicate that further research is needed in this area.

# CHAPTER III

# METHODS AND PROCEDURES

## Subjects

Twenty healthy, female subjects (aged 18 to 30 years), who were not familiar with the objectives of the study, provided their informed, written consent (Appendix B) to participate in the study. Since the nature of the experiment was activity oriented, gender differences could have meant a different orientation ; thus gender could have been a confounding variable. To minimize the effect of this confounding variable, the investigator used female subjects only. The age range of the subjects reflected the population of the university from which the volunteers were selected. Subjects with cardiac problems, neurological, musculoskeletal, arthritic, or respiratory disorders were excluded. All other subjects completed a physical activity readiness questionnaire (Par - Q, see Appendix C). In cases where exercise was contraindicated, participants were disqualified.

## Activities

The eight activities which were selected for this study were those commonly used by occupational therapists as treatment modalities. All eight activities (Appendix D) were bilateral upper extremity activities. All activities were performed from a standing position to eliminate the effect of postural changes on the physiological responses observed during each activity. Each activity had a purposeful and non-purposeful component. For example, when weaving was used in the purposeful condition, the subject used a continuous thread with a goal of making a placemat. During the non-purposeful condition, the subject performed the same repetitive movement pattern but

there was no thread on the shuttle and therefore no product. The protocols for all activities are included in Appendix E.

## Instrumentation

1. Measurement of the Number of Movements Performed During Each Activity (# of Mov)

   The number of movements performed during each activity was recorded using a manual finger counter.

2. Measurement of Heart Rate (HR)

   Heart rate was recorded using a heart rate meter (Sport Tester PE 3000, Polar Electro, Kempele, Finland). The Sport Tester consists of a wireless, lightweight electrode belt and transmitter worn on the chest and a small receiver which registers the heart beat frequency of the user in beats per minutes. Leger and Thivierge (1988) studied the validity of this instrument against ECG recordings at various HR levels for this instrument and reported a validity coefficient of 0.97.

3. Measurement of Blood Pressure (BP)

   Blood pressure was monitored by the auscultation technique using a stethoscope and sphygmomanometer. Tester reliability was established prior to starting the study by taking repeated blood pressures of 35 subjects; a reliability coefficient of 0.99 was obtained.

4. Measurement of Perceived Exertion (RPE)

   The Rating of Perceived Exertion scale, developed by Borg (Appendix A) was used to rate levels of exertion at the end of each activity performed. This is a 15-point interval scale which was developed on the basis of research on the bicycle

ergometer and was found to have a linear relationship to intensity of exercise and to HR. This scale has been tested for its validity and reliability against HR. Skinner et al. (1973) reported a validity coefficient of 0.79 and a reliability coefficient of 0.80 for this instrument.

## Procedures

Volunteer subjects were obtained from the researcher's social contacts at the university, from informal recreational activities (swimming and softball games) at the university, and through poster advertisements.The purpose of this study was not discussed until the end of each session.The subjects were told that they would be required to perform four activities; HR, BP, and RPE would be recorded during the study.The day before the study, each subject was advised to avoid ingesting foods and nutrients for at least two hours before their participation, in order to minimize possible effects on the physiological responses being monitored, (Fox and Mathews, 1981).

The recording procedure of HR and BP was explained to all subjects, who were then asked to complete the PAR-Q (Appendix C) questionnaire to establish their physical health and to provide written consent (Appendix B) to participate in this study. A list of eight activities and their end products (Appendix D) was provided to all subjects. After watching a demonstration of the purposeful component, subjects were asked to select an activity which they preferred the most and another which they preferred the least. Up to this point the subjects were not informed about the purposeful and non-purposeful component of each activity. Once subjects had selected their most and least preferred activities, they were given a demonstration in the laboratory to orient them to the equipment and their two chosen activities. Subjects were allowed up to two minutes to practice the selected activities. After the practice session, the subjects were

randomly assigned to one of the eight possible activities sequences (Appendix F) to control for possible order effects. Thereafter the non-purposeful component of the two activities selected was explained to each subject. The Borg Scale was then reviewed with each subject , following which they were asked to do all the activities at their own speed. Each subject performed four activities (most preferred purposeful activity, least preferred purposeful activity, most preferred non-purposeful activity, and least preferred non-purposeful activity ) with a ten minute rest period between each activity.

After the orientation session, subjects were asked to stand quietly until they reached a steady resting HR. This was determined by observing three similar HR's in three successive 30 second intervals. Once subjects reached their steady resting heart rate, initial blood pressure (IBP) was recorded and subjects were asked to begin their activities. The subject performed the same activity at her own speed for eleven minutes. The number of repetitive movements made in the first ten minutes was recorded with the manual counter. At the end of the first ten minutes, the subject was asked to indicate her RPE level. The final HR (FHR) was recorded during the last 30 seconds of activity and the final Blood Pressure (FBP) was recorded immediately at the end of the activity. Differences between the initial and final values for HR and BP were calculated and used for statistical analysis.

## Experimental Design

A 2 x 2 factorial design with correlated groups (Appendix G) was employed. Factor A had two levels that pertained to condition, namely, purposeful and non-purposeful ; and Factor B also had two levels which pertained to activity, namely, most and least preferred.The strength of the factorial correlated group design is that an

investigator is able to isolate and measure variances and to test interactions (Kerlinger, 1973).

## STATISTICAL ANALYSIS

Four different measurements ( # of Mov, HR, BP and RPE ) were recorded on the score sheet (Appendix H). Four separate univarite analyses of variance were calculated using the MANOVA program documented by SPSSx.

Champion (1981) recommended that in a factorial design one must have at least 10 scores in each cell. To make the experimental design stronger and to allow some margin for error (i.e. drop out, error in data collection, etc.), 20 subjects were recruited for this study.

In interpreting an analysis of variance, Keppel (1982) suggested that one should first examine the complex interaction. If there was a significant "F" ratio, then each factor should be examined at each level of the other factors. If it was not significant, then one should examine the main effects only. In this study, the complex interaction was the interaction between conditions (purposeful and non-purposeful conditions) and activities (most and least preferred activities). When the F ratio of main effects was significant at an alpha level of 0.05, the appropriate 't' test was used to determine the exact location of differences. Since only two groups were used in this study, a simple 't' test was used instead of a Scheffé test, because the Scheffé test for two groups is similar to a simple 't' test (Ferguson, 1976, p. 296).

# CHAPTER IV

# RESULTS

## Characteristics of the Participants

The mean age of 20 female, volunteer subjects was 22.5 with a S.D of 3.6. The individual ages of each subject are given in Table 13 (Appendix I). The subjects were students registered in different faculties of the University of Alberta (excluding those registered in the Department of Occupational Therapy). The subjects did not have any prior experience in any of the selected activities. The number of subjects who selected each activity as most and least preferred are given in Table 1.

**TABLE 1** Number of subjects who selected a particular activity.

| ACTIVITIES | NO.OF.SUBJECTS | |
|---|---|---|
| | Most pref. | Least pref. |
| Block printing | 5 | 2 |
| Nail/Thread Art | 1 | 1 |
| Drill Press | 3 | 8 |
| Rug Hooking | 1 | 2 |
| Leather work | 6 | 2 |
| Weaving | 2 | 2 |
| Macrame | 1 | 2 |
| Painting | 1 | 1 |

## Analysis of Variance

The results of the analysis of variance for each of the variables (# of Mov, HR, BP, and RPE ) are discussed separately. In this study, there were no significant two-way (AB) interactions for any of the variables examined. The next logical step, therefore, was to examine the main effects of each factor. These results, along with those of the 't' test where necessary, were as follows:

1. Number of Movements (# of Mov) during the purposeful and non-purposeful conditions when the subjects were engaged in the most and least preferred activities:

Table 2 shows the mean and standard deviations of # of Mov. for the four different activities. The individual values for the # of Mov. are given in Table 14 (Appendix I ).

**TABLE 2** Mean and standard deviation of the number of movements during the purposeful and non-purposeful conditions when subjects were engaged in the most and least preferred activities.

| | CONDITIONS | | | |
|---|---|---|---|---|
| ACTIVITIES | PURPOSEFUL | | NON-PURPOSEFUL | |
| PREFERENCE | Mean | S.D. | Mean | S.D. |
| MOST | 63.3 | 33.7 | 82.9 | 39.1 |
| LEAST | 63.1 | 31.9 | 84.4 | 43.6 |

The analysis of variance with repeated measures for # of Mov (Table 3) revealed that:

a) There was no significant difference between the # of Mov when the subjects were engaged in purposeful and non-purposeful conditions (p=0.73).

b) There was no significant difference in the # of Mov when subjects were engaged in most and least preferred activities ($p = 0.21$).

**TABLE 3** Summary of Analysis of Variance for the Number of Movements.

| SOURCE | S.S. | DF | MS | F | P |
|---|---|---|---|---|---|
| CONDITIONS | 0.1 | 1 | 0.0 | 0.1 | 0.73 |
| ACTIVITIES | 4.8 | 1 | 4.8 | 1.7 | 0.21 |
| CONDITIONS x ACTIVITIES | 0.1 | 1 | 0.1 | 0.2 | 0.71 |

2. Heart Rate (HR) responses during the purposeful and non-purposeful conditions when subjectes were engaged in the most and least preferred activities:

Table 4 shows the mean and standard deviations of the increase in HR during the purposeful and non-purposeful conditions of the most and least preferred activities. The mean scores were higher during non-purposeful conditions for both the activities and least preferred activities under both the conditions. The individual values of the initial, final, and increase in HR are recorded in Table 15 (Appendix I).

**TABLE 4** Mean and standard deviation of the increase in HR during the purposeful and non-purposeful conditions when subjects were engaged in the most and least preferred activities.

| | CONDITIONS | | | |
|---|---|---|---|---|
| ACTIVITIES | PURPOSEFUL | | NON-PURPOSEFUL | |
| PREFERENCE | Mean | S.D. | Mean | S.D. |
| MOST | 18 | 4.8 | 21 | 6.8 |
| LEAST | 21 | 6.5 | 24 | 6.5 |

The analysis of variance with repeated measures on HR given in Table 5 indicated that :

a) There were significant differences in increase in HR between the purposeful and non-purposeful conditions (p=0.00).

b) There were significant differences in the increase in HR between the most and least preferred activities (p=0.01).

**TABLE 5** Summary of Analysis of Variance for Increase in HR.

| SOURCE | S.S. | DF | MS | F | P |
|---|---|---|---|---|---|
| CONDITIONS | 231.2 | 1 | 231.2 | 16.9 | 0.00* |
| ACTIVITIES | 186.0 | 1 | 186.0 | 8.0 | 0.01* |
| CONDITIONS x ACTIVITIES | 1.8 | 1 | 1.8 | 0.1 | 0.67 |

*Statistically significant at the 0.05 level.

The post hoc analysis of the main effects (Tables 6 and 7) revealed that :

a) The increase in HR was significantly higher during the non-purposeful conditions for both the most and least preferred activities (p =0.00 in each case).

b) The increase in HR was significantly higher during the least preferred activities for both the purposeful and non-purposeful conditions (p=0.01 in each case).

**TABLE 6** "t" test result for conditions.

| Comparision | Activity | t | p |
|---|---|---|---|
| Purposeful vs Non-purposeful condition | Most preferred | -2.99 | 0.00 |
| Purposeful vs Non-purposeful condition | Least preferred | -3.43 | 0.00 |

**TABLE 7** " t " test result for activities.

| Comparision | Condition | t | p |
|---|---|---|---|
| Most preferred vs Least preferred Activity | Purposeful | -2.79 | 0.00 |
| Most preferred vs Least preferred Activity | Non-purposeful | -2.03 | 0.00 |

3. Blood Pressure (BP) responses during the purposeful and non-purposeful conditions when subjects were engaged in the most and least preferred activities.

Table 8 shows the mean and standard deviations of the increase in BP during each of the four conditions. The trends were different when BP was examined. Mean values of the increase in BP during each of the four activities were almost identical. The initial and final systolic, diastolic, and mean BP of the individual subjects during each of the four activities are presented in Table 16 (Appendix I ).

**TABLE 8** Mean and standard deviation of the increase in BP during the purposeful and non-purposeful conditions when subjects were engaged in the most and least preferred activities.

| | CONDITIONS | | | |
|---|---|---|---|---|
| ACTIVITIES | PURPOSEFUL | | NON-PURPOSEFUL | |
| PREFERENCE | Mean | S.D. | Mean | S.D. |
| MOST | 0.5 | 0.9 | 0.8 | 1.2 |
| LEAST | 0.6 | 2.1 | 0.7 | 1.3 |

The analysis of variance with repeated measure on BP (Table 9 ) revealed that :

a) There was no significant difference in the increase in BP between purposeful and non-purposeful conditions ($p = 0.35$).

b) There was no significant difference in the BP response between most preferred and least preferred activities ($p = 0.75$).

**TABLE 9** Summary of Analysis of Variance for Increase in BP.

| SOURCE | S.S. | DF | MS | F | P |
|---|---|---|---|---|---|
| CONDITIONS | 1.2 | 1 | 1.2 | 0.9 | 0.35 |
| ACTIVITIES | 0.1 | 1 | 0.1 | 0.1 | 0.75 |
| CONDITIONS x ACTIVITIES | 0.1 | 1 | 0.1 | 0.1 | 0.76 |

4. Ratings of Perceived Exertion (RPE) during the purposeful and non-purposeful conditions when subjects were engaged in the most and least preferred activities:

Table 10 shows the mean and standard deviations of the RPE scores for each of the activities. The individual values for the four different activities are given in Table 17 (Appendix I).

**TABLE 10** Mean and standard deviation of the RPE during the purposeful and non-purposeful conditions when subjects were engaged in the most and least preferred activities.

| | CONDITIONS | | | |
|---|---|---|---|---|
| ACTIVITIES | PURPOSEFUL | | NON-PURPOSEFUL | |
| PREFERENCE | Mean | S.D. | Mean | S.D. |
| MOST | 8.2 | 1.8 | 8.1 | 2.1 |
| LEAST | 10.1 | 2.9 | 10.2 | 2.6 |

The analysis of variance with repeated measures of RPE (Table 11) and 't' test result (Table 12), revealed that:

a) There was no significant difference in the RPE when subjects were engaged in both purposeful and non-purposeful conditions (p=0.98).

b) There were significant differences in RPE when subjects were engaged in most and least preferred activities (p =0.00). RPE scores were significantly higher during both the least preferred purposeful (p=0.00) and non-purposeful (p=0.00) activities.

**TABLE 11** Summary of Analysis of Variance for RPE.

| SOURCE | S.S. | DF | MS | F | P |
|---|---|---|---|---|---|
| CONDITIONS | 0.E-3 | 1 | 0.9E-3 | 0.2E-3 | 0.98 |
| ACTIVITIES | 78.0 | 1 | 78.0 | 17.5 | 0.00* |
| CONDITIONS x ACTIVITIES | 0.1 | 1 | 0.1 | 0.0 | 0.91 |

*Statistically significant at alpha 0.05

**TABLE 12** " t " test result for activities.

| Comparision | Condition | t | p |
|---|---|---|---|
| Most preferred vs least preferred Activity | Purposeful | -2.91 | 0.00 |
| Most preferred vs Most preferred Activity | Non-purposeful | -2.92 | 0.00 |

## Summary

The # of Mov and BP values were not significantly different during the purposeful and non-purposeful conditions and the most and least preferred activities. The HR values were significantly higher during the non-purposeful conditions and the least preferred activities. The RPE were significantly higher during the least preferred activities for both conditions.

# CHAPTER V

## DISCUSSION

The discussion is divided into the following sections according to the variables being measured:

1. Comparison of purposeful vs. non-purposeful condition and most preferred vs. least preferred activitiy by monitoring the number of movements

Generally, an increase in the number of movements during an activity suggests that the intensity associated with that activity is elevated. Steinbeck (1986) reported that the number of repetitions was significantly higher during purposeful activity for both upper and lower extremity activities. Therefore, subjects were working with higher intensity during purposeful activities. In Steinbeck's study, purposeful activities were performed for a longer period of time and that, most likely, was the reason for the higher number of repetitions. The findings of this study did not support the evidence provided by Steinbeck. The current observations indicated an approximately 25% lower number of movements during purposeful conditions for both types of activities, but these values were not statistically significant most likely because of the higher standard deviations associated with these measurements. These findings supported the null hypothesis, and suggest that in spite of the freedom of speed, preference and purposefulness of an activity need not necessarily affect the number of movements or increase the intensity of the action.

2. Comparison of purposeful vs. non-purposeful condition and most preferred vs. least preferred activity by monitoring Heart Rate

The increase in HR was significantly higher during non-purposeful conditions while the subjects were engaged in both the most and least preferred activities. It was hypothesised that there would be no significant difference in the increase in HR when subjects performed the purposeful and non-purposeful components of the most and least preferred activities. The findings of this study did not support the null hypothesis, and therefore the alternative hypothesis was accepted. These observations support the basic premise underlying the concept of occupational therapy, that during non-purposeful activity, a subject would have worked harder and consequently would have got tired faster and ceased their therapy much earlier. Therefore, the therapeutic benefits would not be as great as those resulting from engagement in purposeful activity. The results of the present study did not support the findings reported by Kircher (1984); Steinbeck (1986); Bloch et al.(1989). These investigators reported that the increase in HR was greater during purposeful activity than during non-purposeful activity. However in their studies, purposeful activities were performed for a longer time period and therefore the longer duration might have caused the higher HR. To some extent, the findings of this study support the results of those published by Thibodeaux and Ludwig (1988). The upper extremity activities used in the present study were comparable to those used by these authors and fourteen out of their fifteen subjects demonstrated a greater or equivalent increase in heart rate during non-purposeful activity. A similar trend was noted in the present study (Table 15 - Appendix I).

No other studies have been published to compare HR during most and least preferred activities. In this study, the increase in final heart rate was significantly higher during both conditions (purposeful and non-purposeful) for least preferred activities.

During the least preferred activity, the lack of motivation may have increased the difficulty level, thus increasing the HR. This finding also rejects the null hypothesis that there would be no difference in the increase in HR during most and least preferred activities.Therefore the alternative hypothesis was accepted

The increase in HR during an activity suggests that the cardiovascular stress associated with that activity is elevated. A higher heart rate lowers the mechanical efficiency of the heart by increasing its oxygen uptake for a given cardiac output. With a higher HR, the blood flow through the heart muscle is reduced, thus myocardial oxygen demand increases ( Kitamura, Jorgensen, Gobel, Taylor, & Wang, 1972). In occupational therapy practice, the therapist should try to prevent a substantial increase in heart rate to prevent cardiac stress and to prevent other complications which would be associated with impaired circulation in cardiac muscle.

3. Comparison of purposeful vs. non-purposeful condition and most preferred vs. least preferred activity by monitoring Blood Pressure

Generally, an increase in BP during an activity suggests that cardiovascular stress associated with that activity is elevated. In this study, the changes in BP (final minus initial) during four activities were minimal. This was most likely due to the fact that the activities selected for this study were of a light intensity and did not necessitate a substantial increase in this physiological parameter. Usually, during dynamic exercise of moderate to higher intensities, substantial increases in systolic blood pressure are observed with little or no change in diastolic blood pressure (Fox and Mathews, 1981).

The results of the present study indicated that there were no significant differences between purposeful and non-purposeful conditions or between most and

least preferred activities. These observations supported the null hypothesis established and implied that preference and purposefulness of an activity need not necessarily affect the BP responses.

None of the studies that have been conducted to date have examined BP responses during the purposeful and non-purposeful conditions of both the most and least preferred activities, thereby making the present results impossible to compare.

4. Comparison of purposeful vs. non-purposeful conditions and most preferred vs. least preferred activity by monitoring the Rating of Perceived Exertion

As was the case for the BP response, there were no other studies available for comparison of this variable. In the studies cited in the literature review (Chapter II), RPE was used to assist the subjects in determining when to stop their activities; in this study, RPE was measured at the end of the ten minute period of the selected activities.

The results of this study indicated no significant difference in RPE scores when the subjects were engaged in purposeful and non-purposeful conditions of both most and least preferred activities. This finding supported the null hypothesis and implied that the purposefulness of an activity need not necessarily affect the perceived exertion. To account for this finding, one could speculate that the subjects knew that they were taking part in research and that might have given them a sense of purpose, even with the non-purposeful activity. In other words, the subjects may have felt that they were helping the researcher and therefore had a sense of purpose. The sense of purpose could have motivated them to work at the same RPE level during purposeful and non-purposeful conditions.

The comparison between most preferred and least preferred activities showed that the RPE score was significantly higher during the least preferred activities for both

the purposeful and the non-purposeful conditions. This finding rejects the second part of the null hypothesis and supports the assumption that when individuals are involved in least preferred activities, they are less motivated to do the activities and perceive higher rates of exertion. Consequently, they would work for a shorter period of time and therefore, would not benefit as quickly from therapy.

## General Implications for Occupational Therapy

The purpose of this study was to overcome some of the limitations of previous empirical studies, and then to compare the purposeful vs non-purposeful conditions during the most and least preferred activities. The limitations were overcome by (1) allowing subjects to choose their most and least preferredactivities from a list of eight activities, (2) the subjects were allowed to performed all activities at their own speed for a controlled duration rather than exertion level, (3) the rating of perceived exertion was used as a variable rather than a index to stop the activities, and (4) all occupational therapy students were excluded from this study.

The results of this study showed that the purpose and preference of an activity did not affect the number of repetitions. However, it was noted that the purpose and preference did have an effect on the HR, which was elevated during the non-purposeful condition and the least preferred activity. Keeping the HR trend in mind, one would conclude that during a given period of time, subjects would perform the same number of repetitions for both purposeful and non-purposeful conditions and the most and least preferred activities, but the cardiovascular stress would be reduced during the purposeful activity and the most preferred activities. Therefore, in a clinical setting, clients would be less tired doing the same number of movements, if the activities were selected according to their preference and had a purpose. Consequently, they would

have more energy to continue their therapy for a longer period of time or to use it to perform other work.

Some of the findings of this study have supported the assumption that the preference and purposefulness of an activity have an effect on the performer. During least preferred activities and non-purposeful conditions, the HR increased significantly but the BP was unchanged. No increase in BP was noted because all activities were light activities and BP increases significantly during a medium to heavy intensity level of a given activity (Fox and Mathews, 1981). The subjects perceived a greater rate of exertion while performing least preferred as well as non-purposeful activity. All subjects stated that if they had a choice of terminating their activity before 11 minutes, they would have done so before they were half way through the non-purposeful activity. Therefore, in clinical settings the individual would likely work for a shorter period of time and, consequently take a longer time to benefit from the treatment.

In terms of relative intensity, exercise can be classified by the recorded HR. A higher HR indicates a greater workload (McArdle et al.,1981 & Astrand et al., 1986). In the present study, HR was significantly higher during both non-purposeful condition and least preferred activity. This would indicate that subjects felt a greater workload during these two conditions. It has been established that the RPE score and HR are correlated linearly (Borg, 1977). In this study, HR and RPE were higher when subjects performed non-purposeful conditions and least preferred activities, indicating an increase in cardiovascular stress during these activities. During cardiovascular stress the heart contracts faster and myocardial oxygen demand increases. The individual might therefore tire faster and quit their activities earlier.

The findings of this study suggest that the purpose and preference had a positive

effect on performance, and thus supported the concept dicussed in the literature by previous researchers in this area.

# CHAPTER VI

# SUMMARY AND CONCLUSIONS

## Summary

The purpose of the study was to compare the number of movements, physiological responses (HR, BP), and perceptual responses (RPE on the Borg Scale) during (1) the purposeful vs. non-purposeful condition, and (2) the most vs. least preferred activity. Twenty female volunteers participated in the study. Each subject was provided with a list of eight activities and was asked to select an activity which she preferred the most and another which she preferred the least. Once subjects had selected their most and least preferred activities, they were given a demonstration in the laboratory to orient them to the equipment and their two chosen activities. Subjects were allowed up to two minutes to practice the selected activities. Thereafter the non-purposeful component of the two activities selected was explained to each subject and they were asked to do all the activities at their own speed. Each subject performed four activities (most preferred purposeful activity, least preferred purposeful activity, most preferred non-purposeful activity, least preferred non-purposeful activity) with a ten minute rest period between each activity.The data collected were subjected to a two-way analysis of variance with repeated measures on both factors, and the significant 'F' ratios were subjected to the appropriate 't' test to locate the differences between conditions and activities.

## Conclusions

Within the limitations of this study, the following conclusions were drawn:

1. Purpose and preference for an activity did not have a significant effect on the number of movements performed during the specified period.

2. The increase in HR during the least preferred activities was significantly greater than that observed for the most preferred activities.

3. The increase in HR during non-purposeful conditions was significantly greater than that observed in purposeful conditions for both activities.

4. There were no significant differences in the increase in BP during the purposeful and non-purposeful conditions or during the most and least preferred activities.

5. The RPE scores during the least preferred activities for both purposeful and non-purposeful conditions were significantly higher than those observed during the most preferred activities for both purposeful and non-purposeful conditions

## Implications for Occupational Therapy Practice

The therapist should provide a therapeutic activity which has an end product, is meaningful to the client, and has been selected in line with the client's preferences or interests as these conditions are likely to minimize cardiovascular and perceived stress. It is also important to make sure that clients are aware of the purpose of the activity for

then they are more likely to perform the task for a longer period of time and experience less fatigue.

## Recommendations for the Further Research

1. This study was conducted with normal female subjects, but an occupational therapist generally deals with people who have disabilities. Further research in this area should examine the same variables with male and female client populations .

2. In future studies, it is recommended that moderate to heavy activities which provide a stronger stimulus to the cardiovascular system be studied in order to investigate changes in the BP response.

3. Although substantial differences in the number of movements were observed between purposeful and non-purposeful conditions, the mean values were not statistically significant because of the large standard deviation observed in the data. Further research with a larger sample size would minimize sampling error.

4. This study was restricted to only eight activities commonly used by occupational therapists in clinical practice. It is recommended that further research be conducted using other activities in order to substantiate the findings of this study.

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# APPENDIX A
# BORG'S SCALE FOR RATINGS OF PERCEIVED EXERTION

The material involved in this page has been removed because of the unavailability of copyright permission.

The material was the Borg's Scale for Ratings of Perceived Exertion (RPE).

The material was obtained from the following article:

Borg, G.A. (1982). Psychophysical basises of perceived exertion. Medicine and Science in Sports and Exercise,14 (5), 337-381.

# APPENDIX B
# CONSENT FORM

**DEPERTMENT OF OCCUPATIONAL THERAPY**
**Faculty of Rehabilitation Medicine**
**University of Alberta**

INFORMED CONSENT FOR RESEARCH STUDY

I, _____, hereby agree to volunteer in a research study conducted by a graduate student in the Occupational Therapy department.I understand that I will be required to complete four tasks that I select in four different testing sessions, each of approximately 10 minutes duration. Ten to fifteen minutes interval will be given between sessions.

It is my understanding that:

1. Prior to any of these tests, I will be provided with proper instruction and training pertaining to this mode of activity.

2. The data collected will belong to the Department of Occupational Therapy, and will be utilized in a manner that does not reveal my identity.

I am aware that during these tests, my heart rate and blood pressure will be recorded. All the test procedures have been explained to me and I agree to complete these tests as required.I have completed the Physical Activity Readiness Questionnaire (PAR-Q) and the information provided is accurate to the best of my knowledge. I understand that if, at any time during these tests or training, I experience any unusual discomfort, I will be allowed to discontinue the activity and OPT out of the study without any obligation of offering an explanation.

BY SIGNING THIS FORM I AGREE TO:

Participate in this study, on the condition that withdrawal from it will not have any influence on the rights and benefits accorded to me , by my employer or Worker's Compensation Board.

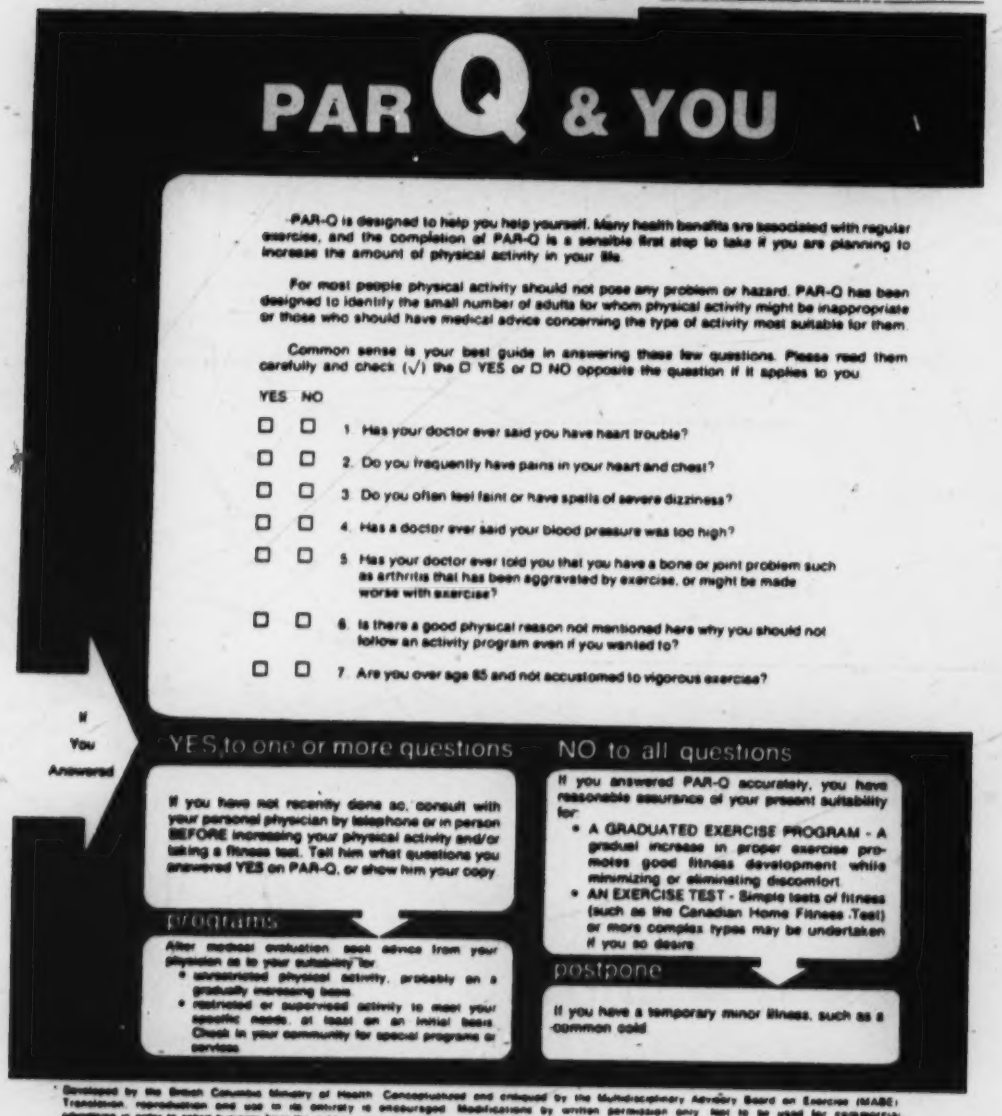
_____ DATE: _____
(Subject's Signature)

_____ DATE: _____
(Witness's Signature)

APPENDIX C
PAR - Q & YOU

PARTICIPANT IDENTIFICATION _____

Physical Activity Readiness Questionnaire (PAR-Q)*


PAR Q & YOU
PAR-Q is designed to help you help yourself. Many health benefits are associated with regular exercise, and the completion of PAR-Q is a sensible first step to take if you are planning to increase the amount of physical activity in your life.
For most people physical activity should not pose any problem or hazard. PAR-Q has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them.
Common sense is your best guide in answering these few questions. Please read them carefully and check (√) the ☐ YES or ☐ NO opposite the question if it applies to you.
YES NO
1. Has your doctor ever said you have heart trouble?
2. Do you frequently have pains in your heart and chest?
3. Do you often feel faint or have spells of severe dizziness?
4. Has a doctor ever said your blood pressure was too high?
5. Has your doctor ever told you that you have a bone or joint problem such as arthritis that has been aggravated by exercise, or might be made worse with exercise?
6. Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to?
7. Are you over age 65 and not accustomed to vigorous exercise?
If You Answered
YES to one or more questions
If you have not recently done so, consult with your personal physician by telephone or in person BEFORE increasing your physical activity and/or taking a fitness test. Tell him what questions you answered YES on PAR-Q, or show him your copy.
programs
After medical evaluation seek advice from your physician as to your suitability for:
• unrestricted physical activity, probably on a gradually increasing basis
• restricted or supervised activity to meet your specific needs, at least on an initial basis. Check in your community for special programs or services.
NO to all questions
If you answered PAR-Q accurately, you have reasonable assurance of your present suitability for:
• A GRADUATED EXERCISE PROGRAM - A gradual increase in proper exercise promotes good fitness development while minimizing or eliminating discomfort.
• AN EXERCISE TEST - Simple tests of fitness (such as the Canadian Home Fitness Test) or more complex types may be undertaken if you so desire.
postpone
If you have a temporary minor illness, such as a common cold
* Developed by the British Columbia Ministry of Health. Conceptualized and critiqued by the Multidisciplinary Advisory Board on Exercise (MABE). Translation, reproduction and use in its entirety is encouraged. Modifications by written permission only. Not to be used for commercial advertising in order to obtain business from the public.
Reference: PAR-Q Validation Report, British Columbia Ministry of Health, 1978.
* Produced by the British Columbia Ministry of Health and the Department of National Health & Welfare

* Produced by the British Columbia Ministry of Health and the Department of National Health and Welfare 1978.

# APPENDIX D
# LIST OF ACTIVITIES

## LIST OF ACTIVITIES SELECTED FOR THIS STUDY

| | ACTIVITIES | END PRODUCTS |
|---|---|---|
| 1 | Block Printing | Wrapping Paper |
| 2 | Nail / Thread Art | Wallhanging |
| 3. | Drill Press | Chinese Checker Board |
| 4. | Rug hooking | Cushion cover |
| 5. | Leather Work | Book mark |
| 6. | Weaving | Placemat |
| 7. | Macrame | Plant hanger |
| 8 | Panting | Wrapping paper |

# APPENDIX E
# PROTOCOLS OF ALL THE ACTIVITIES

BLOCK PRINTING

During purposeful condition, wrapping paper was made with a printing block, paint and 30"x 20" tissue paper. The paint was placed in a shallow dish. The subject picked up the roller, dipped it in the paint, rolled it three times over the surface of the printing block. Then the block was pressed on the tissue paper. This was repeated until each paper was finished and then the subject started with a new piece of paper. Subjects were not restricted in how they applied the design.

During non-purposeful condition, the subject did exactly the same repetitive action, using the same tools, but there was no paint and therefore no tangible product was produced.

FIGURE-1 Block Printing

NAIL AND THREAD ART

During purposeful condition, the subject used thread and made a wall-picture hanging. The subjects were provided with a board with nails on it. All nails were placed in a circle with a 1/2" gap between (as shown in Figure 2 ). Using a clock analogy, the subjects put a knot in one of the nails close to them (7 o'clock position nail A) and then brought the thread to a nail near the eleven o'clock position (nail B), turned around that nail, returned and wound around nail "A" and then brought the thread to the next nail to the right of nail "B", nail "C", forming a fan pattern, (as shown in Figure 2), Subjects always returned to nail "A".

During non-purposeful condition, the subjects did not use any thread, but made the movements as if they were holding a thread. They repeated all the movements mentioned in purposeful condition, instead of passing the thread around the nail, they touched all those nails with their fingers. Again, as there was no thread, they did not produce any tangible product.

FIGURE-2 Nail and Thread Art

DRILL PRESS

During purposeful condition, the subjects made a game board similar to Chinese Checkers. 12" x 12" x 1/2" plywood boards were used. The subjects used a 1/4" drill bit to make a 1/4" deep hole, holes were marked one inch apart on the board. A stopper on the handle of the drill press ensured consistent depth. Subjects were asked to line up the drill with the marking for the hole. When subjects reached the stopper, they were asked to hold the handle at that position for three seconds by counting "1001, 1002, and 1003".

During non-purposeful condition, the subjects used the same size of plywood board with two pencil marks (one inch apart) in the centre of the board. The stopper on the handle was kept as above, but the platform of the machine was lowered approximately 1/4", so that when the handle was lowered, it did not touch the plywood (in other words, drill any holes). During this condition, subjects used only two marks alternatively for 10 minutes Subjects again counted for three seconds. Counting was an important factor for the depth of the hole as well as for the non-purposeful condition. No holes were made, consequently no game board was produced.

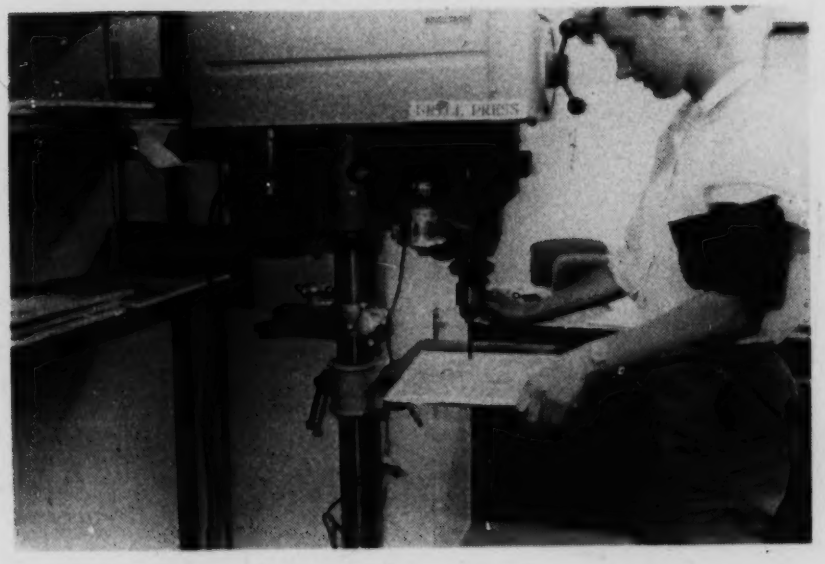


FIGURE-3 Drill Press

RUG HOOKING

Latch-hook, precut yarn and latch-hook canvas was used for rug hooking. During purposeful condition, a simple latch-hooking technique was used (Scobey and Sablow-1977) to secure the knot around the canvas thread. The Subjects' goal was to make a 12" x 12" cushion cover. Next, during non-purposeful condition, the same repetitive movements were performed, except the ends of the yarn were kept over the latch and under the hook and yarn ends were not held tightly as the subject drew the hook towards her with the other hand. Therefore, the yarn ends were not drawn through the mesh holes and the looped yarn the subject pulled the hook toward her, but no knot was formed. There was no knot and, therefore, there was no tangible end product.

FIGURE-4 Rug Hooking

LEATHER WORK

Pre-cut 8"x 2" leather for bookmarks was used for this activity. During purposeful condition, the subjects used three different stamps to make patterns on the leather piece. For each placement of the stamp, subjects were allowed only one strike. They chose and placed the stamp according to a pattern they selected during a practice session.

During non-purposeful condition, 1/2" foam was glued on a 8"x 2" construction paper, then placed on top of the bookmark. Then subjects were asked to make the pattern they had chosen during the practice session on top of the foam. Subjects did the same repetitive movements but there was no impression on the leather, therefore, did not produce any bookmark.

FIGURE-5 Leather Work

WEAVING

Weaving was done on a standard loom. During purposeful condition, a full shuttle of weft yarn was pushed through the shed.* Alternatively, the heddle bar was moved up and down between passes of the shuttle. Each time after passing the shuttle, the yarn was beaten into place three times with the heddle bar.

During non-purposeful condition, all movements were the same except there was no weft yarn in the shuttle. Therefore, there was no tangible product.

FIGURE-6 Weaving

* When the rigid heddle of the loom was pulled up or down, one set of yard rides above the other. The wedge-shaped space between the two layers is known as a "shed "(Holland, 1978).

MACRAME

The height of this activity was adjusted according to the height of the subject, so each subject was working at eye level.

During purposeful condition, the subject made square knots (Pegg, 1977) around two holding cords to form a plant hanger.

During non-purposeful condition, there was no holding cord and a metal ring was used for subjects to pull the cord through. When they did this, no knot was formed, but movements similar to the purposeful condition were used. There were no knots, therefore there was no product.

FIGURE-7 Macrame Work

PAINTING

During purposeful condition, food colouring dissolved in water as paint and a thick brush # 8 was used to draw horizontal stripes on the 30"x 20" coloured tissue paper. The subjects drew one horizontal line using 4 strokes as shown in the Figure -8. Before each stroke, they dipped their brushes in the paint and then took off the excess paint against the inner edge of the paint container. The subjects started painting horizontal stripes at the top of the paper and worked down. The end product was wrapping paper.

During non-purposeful condition, the subjects used the same four strokes for each line, but there was no colour. They used clear water instead of coloured water. They made two imaginary lines, repetitively at the middle of the tissue paper. This was so that they could not see where they had already "painted". The subjects had followed all the steps described during purposeful condition. As there was no colour, there was no end product.

FIGURE-8 Painting

# APPENDIX F
# SEQUENCE OF ASSIGNMENT

The sequence for the assignment of subjects to the four different conditions

The following four activities were used in this study:

Most Preferred Activity (M)
Least Preferred Activity (L)
Purposeful Activity (P)
Non-purposeful Activity (N)

Keeping both Purposeful and Non-purposeful components together, one can generate the following eight combinations.

| | | | | |
|---|---|---|---|---|
| 1. | MP | MN | LP | LN |
| 2. | LP | LN | MP | MN |
| 3. | LN | LP | MN | MP |
| 4. | MN | MP | LN | LP |
| 5. | MP | MN | LN | LP |
| 6. | LP | LN | MN | MP |
| 7. | LN | LP | MP | MN |
| 8. | MN | MP | LP | LN |

# APPENDIX G
# EXPERIMENTAL DESIGN

## EXPERIMENTAL DESIGN*

| | CONDITIONS(A) | |
|---|---|---|
| ACTIVITIES(B) | PURPOSEFUL | NON-PURPOSEFUL |
| MOST PREFERRED (I) | | |
| LEAST PREFERRED (II) | | |

2 way analysis of variance with repeated measures on both factors

*2x2 FACTORIAL DESIGN

APPENDIX H
SCORE SHEET

**Faculty of Rehabilitation Medicine**

**University of Alberta**

EFFECTS OF PURPOSEFUL VS NON-PURPOSEFUL ACTIVITIES

**Score Shee**

Name_____ AGE:_____ Date of birth:_____Date:_____

Telephone #:_____Dominant hand:____Consent signed:____ PAR-Q.signed:_____

Most pref activity_____ Least pref activity_____

Order_____

| PURPOSEFUL CONDITION | | | | | | |
|---|---|---|---|---|---|---|
| | HR | | BP | | RPE | # of Mov |
| | I | F | I | F | | |
| MOST PREFERRED ACTIVITY (I) | | | | | | |
| LEAST PREFERRED ACTIVITY (II) | | | | | | |

| NON-PURPOSEFUL CONDITION | | | | | | |
|---|---|---|---|---|---|---|
| | HR | | BP | | RPE | # of Mov. |
| | I | F | I | F | | |
| MOST PREFERRED ACTIVITY (I) | | | | | | |
| LEAST PREFERRED ACTIVITY (II) | | | | | | |

# APPENDIX I
# RAW DATA

TABLE 13 Characteristics Of Subjects

| I.D | Age | Most pref.Activity | Least pref.Activity |
|---|---|---|---|
| 1 | 23 | Weaving | Drill press |
| 2 | 19 | Drill press | Weaving |
| 3 | 25 | Leather work | Drill press |
| 4 | 19 | Painting | Macrome |
| 5 | 19 | Drill press | Painting |
| 6 | 18 | Drill press | Nail /thread art |
| 7 | 18 | Block printing | Drill press |
| 8 | 23 | Leather work | Weaving |
| 9 | 20 | Weaving | Drill press |
| 10 | 29 | Block printing | Rug hooking |
| 11 | 21 | Rug hooking | Nail /thread art |
| 12 | 18 | Leather work | Drill press |
| 13 | 23 | Macrome | Block printing |
| 14 | 24 | Nail /thread art | Leather work |
| 15 | 24 | Block printing | Drill press |
| 16 | 21 | Leather work | Drill press |
| 17 | 21 | Leather work | Drill press |
| 18 | 28 | Block printing | Rug hooking |
| 19 | 25 | Block printing | Leather work |
| 20 | 24 | Leather work | Macrome |

Mean Age=22.5 S.D=_3.6

TABLE -14 Raw Score for # of Mov.

| | Purposeful condition | | Non-purposeful condition | |
|---|---|---|---|---|
| | Most pref.activity | Least pref.activity | Most. pref.activity | Least pref.activity |
| ID | No of Mov | No of Mov | No of Mov | No of Mov |
| 1 | 64 | 74 | 61 | 64 |
| 2 | 89 | 25 | 100 | 37 |
| 3 | 62 | 75 | 74 | 81 |
| 4 | 32 | 28 | 36 | 26 |
| 5 | 121 | 81 | 128 | 97 |
| 6 | 126 | 34 | 163 | 130 |
| 7 | 98 | 114 | 114 | 210 |
| 8 | 65 | 15 | 107 | 34 |
| 9 | 23 | 76 | 36 | 121 |
| 10 | 60 | 24 | 88 | 47 |
| 11 | 18 | 71 | 27 | 70 |
| 12 | 83 | 86 | 66 | 75 |
| 13 | 35 | 68 | 46 | 75 |
| 14 | 42 | 108 | 53 | 98 |
| 15 | 26 | 60 | 40 | 90 |
| 16 | 109 | 100 | 133 | 106 |
| 17 | 59 | 90 | 91 | 88 |
| 18 | 27 | 21 | 66 | 52 |
| 19 | 38 | 88 | 87 | 141 |
| 20 | 89 | 25 | 141 | 46 |

TABLE-15 Raw score of initial, final, and increase in HR of individual subjects.

| | Purposeful condition | | | | | | Non-purposeful condition | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Most pref.activity. | | | Most pref.activity | | | Most pref.activity. | | | Most pref.activity. | | |
| | Heart Rate | | | Heart Rate | | | Heart Rate | | | Heart Rate | | |
| I.D. | I | F | Inc. | I | F | Inc | I | F | Inc | I | F | Inc |
| 1 | 75 | 91 | 16 | 76 | 93 | 17 | 75 | 93 | 18 | 77 | 98 | 21 |
| 2 | 71 | 90 | 19 | 71 | 92 | 21 | 71 | 85 | 14 | 70 | 95 | 25 |
| 3 | 65 | 85 | 20 | 63 | 86 | 23 | 63 | 87 | 24 | 64 | 92 | 28 |
| 4 | 83 | 90 | 7 | 85 | 99 | 14 | 79 | 99 | 20 | 80 | 102 | 22 |
| 5 | 72 | 85 | 13 | 70 | 92 | 22 | 70 | 92 | 22 | 70 | 94 | 24 |
| 6 | 77 | 100 | 23 | 76 | 98 | 22 | 77 | 110 | 33 | 77 | 109 | 32 |
| 7 | 68 | 99 | 21 | 65 | 92 | 27 | 66 | 89 | 23 | 65 | 98 | 33 |
| 8 | 79 | 93 | 14 | 78 | 84 | 6 | 79 | 96 | 17 | 79 | 91 | 12 |
| 9 | 56 | 72 | 16 | 56 | 82 | 26 | 57 | 84 | 27 | 55 | 84 | 29 |
| 10 | 63 | 86 | 23 | 65 | 91 | 26 | 65 | 91 | 26 | 66 | 95 | 29 |
| 11 | 61 | 70 | 9 | 58 | 78 | 20 | 60 | 73 | 13 | 60 | 82 | 22 |
| 12 | 69 | 93 | 24 | 70 | 98 | 28 | 71 | 87 | 16 | 70 | 104 | 34 |
| 13 | 68 | 86 | 16 | 68 | 80 | 12 | 69 | 80 | 11 | 69 | 84 | 15 |
| 14 | 68 | 86 | 18 | 68 | 92 | 24 | 69 | 89 | 20 | 68 | 89 | 21 |
| 15 | 57 | 72 | 15 | 57 | 78 | 21 | 56 | 77 | 21 | 57 | 81 | 24 |
| 16 | 67 | 91 | 24 | 68 | 104 | 36 | 67 | 97 | 30 | 67 | 102 | 35 |
| 17 | 85 | 105 | 20 | 86 | 105 | 19 | 85 | 106 | 21 | 88 | 100 | 12 |
| 18 | 67 | 89 | 22 | 68 | 94 | 26 | 68 | 93 | 25 | 69 | 92 | 23 |
| 19 | 82 | 104 | 22 | 82 | 98 | 16 | 82 | 106 | 24 | 83 | 105 | 22 |
| 20 | 79 | 94 | 15 | 79 | 97 | 18 | 77 | 103 | 26 | 26 | 101 | 23 |

TABLE-16a, Raw data of diastolic, systolic, and mean initial BP of individual subjects.

| | Purposeful condition | | | | | | Non-purposeful condition | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Most pref. activity. | | | Least pref activity | | | Most pref. activity. | | | Least pref.activity | | |
| | B.P | | | B.P | | | B.P | | | B.P | | |
| I.D. | D[1] | S[2] | M[3] | D | S | M | D | S | M | D | S | M |
| 1 | 74 | 104 | 93.9 | 74 | 104 | 93.9 | 74 | 104 | 93.9 | 74 | 104 | 93.9 |
| 2 | 82 | 120 | 116.8 | 82 | 120 | 116.8 | 82 | 120 | 116.8 | 82 | 120 | 116.8 |
| 3. | 72 | 112 | 98.6 | 70 | 110 | 96.5 | 72 | 112 | 98.4 | 68 | 112 | 97.2 |
| 4. | 78 | 112 | 100.5 | 78 | 112 | 100.5 | 78 | 110 | 99.2 | 78 | 112 | 100.5 |
| 5. | 72 | 110 | 97.2 | 72 | 110 | 97.2 | 72 | 110 | 97.2 | 72 | 110 | 97.2 |
| 6. | 82 | 120 | 107.2 | 82 | 120 | 107.2 | 82 | 120 | 107.2 | 82 | 120 | 107.2 |
| 7. | 78 | 114 | 101.9 | 78 | 115 | 102.5 | 78 | 115 | 102.5 | 78 | 116 | 102.5 |
| 8. | 76 | 110 | 98.5 | 76 | 110 | 98.5 | 76 | 110 | 98.5 | 76 | 112 | 99.2 |
| 9. | 88 | 122 | 110.5 | 88 | 120 | 109.2 | 88 | 122 | 110.5 | 88 | 122 | 110.5 |
| 10. | 72 | 102 | 91.9 | 72 | 102 | 91.9 | 72 | 102 | 91.5 | 72 | 102 | 91.5 |
| 11. | 76 | 110 | 98.5 | 76 | 110 | 98.5 | 79 | 111 | 110.2 | 76 | 110 | 98.5 |
| 12. | 88 | 114 | 104.5 | 86 | 114 | 104.5 | 88 | 114 | 105.2 | 86 | 114 | 104.5 |
| 13. | 72 | 102 | 91.9 | 72 | 102 | 91.9 | 72 | 102 | 91.9 | 72 | 102 | 91.9 |
| 14. | 80 | 110 | 99.9 | 80 | 110 | 99.9 | 80 | 110 | 99.9 | 80 | 110 | 99.9 |
| 15. | 72 | 104 | 93.2 | 72 | 104 | 93.2 | 72 | 104 | 93.2 | 72 | 104 | 93.2 |
| 16. | 78 | 114 | 101.9 | 78 | 114 | 101.9 | 74 | 112 | 99.2 | 79 | 112 | 100.9 |
| 17. | 86 | 124 | 111.2 | 86 | 124 | 111.2 | 86 | 124 | 111.2 | 86 | 124 | 111.2 |
| 18. | 82 | 112 | 101.5 | 82 | 112 | 101.5 | 82 | 112 | 101.5 | 82 | 112 | 101.5 |
| 19. | 82 | 122 | 108.5 | 82 | 122 | 108.5 | 82 | 122 | 108.5 | 82 | 122 | 108.5 |
| 20. | 78 | 114 | 101.9 | 78 | 114 | 101.9 | 77 | 114 | 101.5 | 78 | 114 | 101.9 |

[1] Diastolic
[2] Systolic
[3] Mean BP=1/3 D + 2/3 S

TABLE-16b , Raw score of diastolic, systolic and mean final BP of individual subjects.

| | Purposeful condition | | | | | | Non-purposeful condition | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Most pref. activity. | | | Least pref activity | | | Most pref. activity. | | | Least pref.activity | | |
| . | B.P | | | B.P | | | B.P | | | B.P | | |
| I.D. | D | S | M | D | S | M | D | S | M | D | S | M |
| 1 | 78 | 104 | 95.2 | 80 | 104 | 95.9 | 86 | 104 | 97.9 | 86 | 104 | 97.9 |
| 2 | 82 | 120 | 116.8 | 82 | 120 | 116.8 | 82 | 120 | 116.8 | 82 | 120 | 116.8. |
| 3 | 72 | 112 | 98.5 | 72 | 112 | 98.5 | 72 | 112 | 98.4 | 70 | 112 | 97.4 |
| 4. | 78 | 112 | 100.5 | 78 | 112 | 100.5 | 78 | 110 | 99.2 | 78 | 112 | 100.5 |
| 5. | 72 | 110 | 97.2 | 72 | 110 | 97.2 | 72 | 110 | 97.2 | 72 | 110 | 97.2 |
| 6. | 82 | 122 | 108.5 | 82 | 120 | 107.2 | 82 | 120 | 107.2 | 82 | 120 | 107.2 |
| 7. | 78 | 115 | 102.5 | 86 | 115 | 105.2 | 82 | 115 | 102.5 | 78 | 115 | 102.5 |
| 8. | 76 | 110 | 98.5 | 77 | 111 | 99.5 | 76 | 110 | 98.5 | 78 | 112 | 99.5 |
| 9. | 88 | 122 | 110.5 | 88 | 122 | 110.5 | 88 | 122 | 110.5 | 88 | 122 | 110.5 |
| 10. | 74 | 102 | 92.5 | 72 | 104 | 91.9 | 72 | 102 | 91.5 | 72 | 102 | 91.9 |
| 11. | 76 | 110 | 98.5 | 76 | 110 | 98.5 | 78 | 112 | 100.2 | 78 | 110 | 99.2 |
| 12. | 88 | 116 | 106.5 | 86 | 116 | 105.9 | 92 | 114 | 105.2 | 86 | 114 | 104.5 |
| 13. | 72 | 102 | 91.9 | 72 | 104 | 93.2 | 72 | 102 | 91.9 | 72 | 102 | 91.9 |
| 14. | 80 | 114 | 102.5 | 84 | 116 | 105.2 | 88 | 116 | 103.9 | 88 | 116 | 103.9 |
| 15. | 72 | 104 | 93.2 | 72 | 114 | 93.2 | 72 | 104 | 93.2 | 72 | 104 | 93.2 |
| 16. | 78 | 114 | 101.9 | 78 | 114 | 101.9 | 78 | 112 | 99.2 | 82 | 112 | 101.9 |
| 17. | 88 | 124 | 111.8 | 86 | 124 | 111.2 | 88 | 124 | 111.2 | 92 | 126 | 114.5 |
| 18. | 82 | 112 | 101.5 | 82 | 112 | 101.5 | 82 | 112 | 101.5 | 82 | 112 | 101.5 |
| 19. | 82 | 122 | 108.5 | 82 | 122 | 108.5 | 82 | 122 | 108.5 | 82 | 122 | 108.5 |
| 20. | 82 | 116 | 103.5 | 80 | 114 | 102.5 | 82 | 114 | 102.5 | 78 | 114 | 101.9 |

TABLE 16c- Raw Score of Increase in Blood Pressure

| | Purposeful condition | | Non-purposeful condition | |
|---|---|---|---|---|
| | Most pref.activity. | Least pref.activity. | Most pref.activity. | Least pref.activity. |
| ID | BP I * | BP I | BP I | BP I |
| 1 | 1.3 | 2.0 | 4.0 | 4.0 |
| 2 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3 | 0.0 | 2.0 | 0.0 | 0.2 |
| 4 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5 | 0.0 | 0.0 | 0.66 | 0.0 |
| 6 | 1.3 | 0.0 | 0.0 | 0.0 |
| 7 | 0.7 | 2.7 | 1.3 | 0.0 |
| 8 | 0.0 | 1.0 | 0.0 | 0.3 |
| 9 | 0.0 | 1.3 | 0.0 | 0.0 |
| 10 | 0.7 | 0.0 | 0.7 | 0.3 |
| 11 | 0.0 | 0.0 | 0.3 | 0.7 |
| 12 | 2.0 | 1.3 | 1.3 | 0.0 |
| 13 | 0.0 | 1.3 | 0.0 | 0.0 |
| 14 | 2.6 | 5.3 | 4.0 | 4.0 |
| 15 | 0.0 | 0.0 | 0.0 | 0.0 |
| 16 | 0.0 | 0.0 | 1.3 | 1.0 |
| 17 | 0.7 | 1.0 | 0.7 | 3.3 |
| 18 | 0.0 | 0.0 | 0.0 | 0.0 |
| 19 | 0.0 | 0.0 | 0.0 | 0.0 |
| 20 | 1.7 | 0.7 | 1.0 | 0.0 |

* BP increase

BP Increase = (final mean BP - initial mean BP)

TABLE-17 Raw data of RPE.of individual subjects

| | Purposeful condition | | Non-purposeful condition | |
|---|---|---|---|---|
| | Most pref. activity | Least pref.activity | Most pref. activity | Least pref activity |
| ID | RPE | RPE | RPE | RPE |
| 1 | 7 | 11 | 9 | 13 |
| 2 | 9 | 13 | 8 | 11 |
| 3 | 11 | 10 | 11 | 10 |
| 4 | 10 | 11 | 10 | 13 |
| 5 | 7 | 7 | 7 | 7 |
| 6 | 7 | 7 | 8 | 8 |
| 7 | 6 | 6 | 6 | 6 |
| 8 | 9 | 7 | 9 | 7 |
| 9 | 7 | 11 | 6 | 9 |
| 10 | 6 | 7 | 6 | 11 |
| 11 | 11 | 11 | 11 | 10 |
| 12 | 9 | 12 | 13 | 11 |
| 13 | 9 | 9 | 9 | 9 |
| 14 | 6 | 16 | 7 | 14 |
| 15 | 7 | 11 | 6 | 10 |
| 16 | 11 | 13 | 9 | 12 |
| 17 | 8 | 7 | 7 | 10 |
| 18 | 6 | 8 | 6 | 7 |
| 19 | 8 | 9 | 8 | 9 |
| 20 | 10 | 15 | 5 | 16 |